



# Sleepy Travelers

A photograph showing a group of four people (three men and one woman) working together on a whiteboard. One man in a grey blazer is smiling and pointing at the board. The other three individuals are partially visible in the foreground.

# The Team

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Back end Programming

Qianna Xu

Visualization



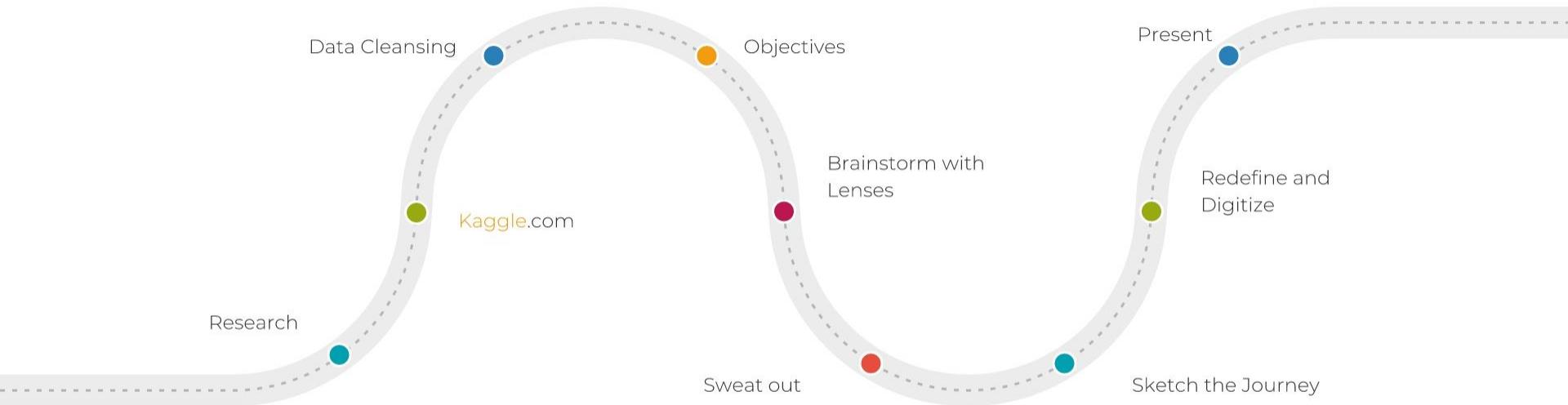
# Acknowledgment/Citation

1

Moosavi, Sobhan, Mohammad Hossein Samavatian, Srinivasan Parthasarathy, and Rajiv Ramnath. "A Countrywide Traffic Accident Dataset.", 2019.

2

Moosavi, Sobhan, Mohammad Hossein Samavatian, Srinivasan Parthasarathy, Radu Teodorescu, and Rajiv Ramnath. "Accident Risk Prediction based on Heterogeneous Sparse Data: New Dataset and Insights." In proceedings of the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, ACM, 2019.



Customer Journey

Trend of accidents data  
before/after Pandemic?



Q1

Effect of environmental  
factors on the trend of  
accidents?



Q2

East coast vs West coast?



Q3

Timing of day impact on  
likelihood of traffic  
accidents?

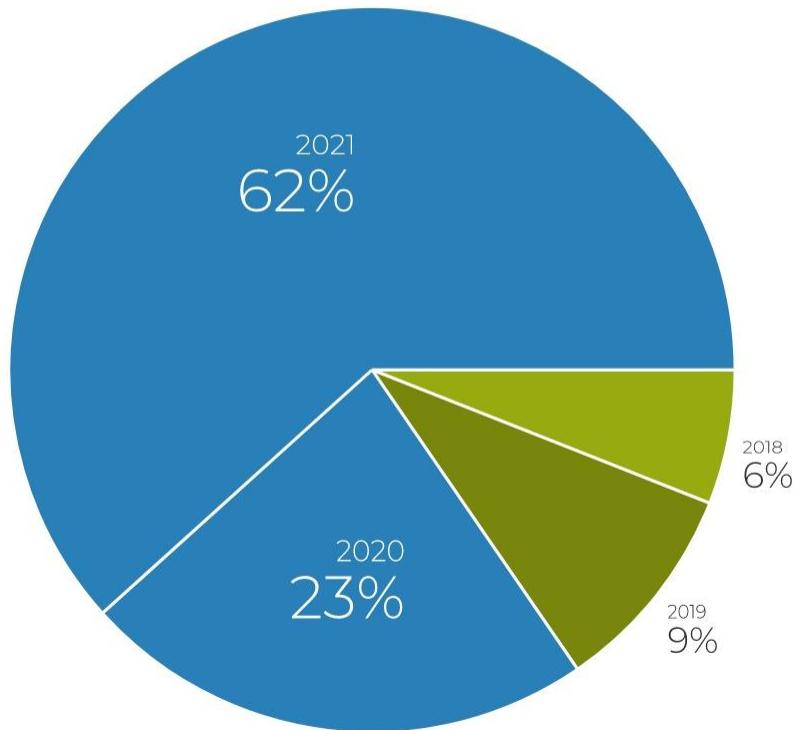


Q4

Accidents trend by year



# Accidents trend before and after



**85%**

DURING PANDEMIC:

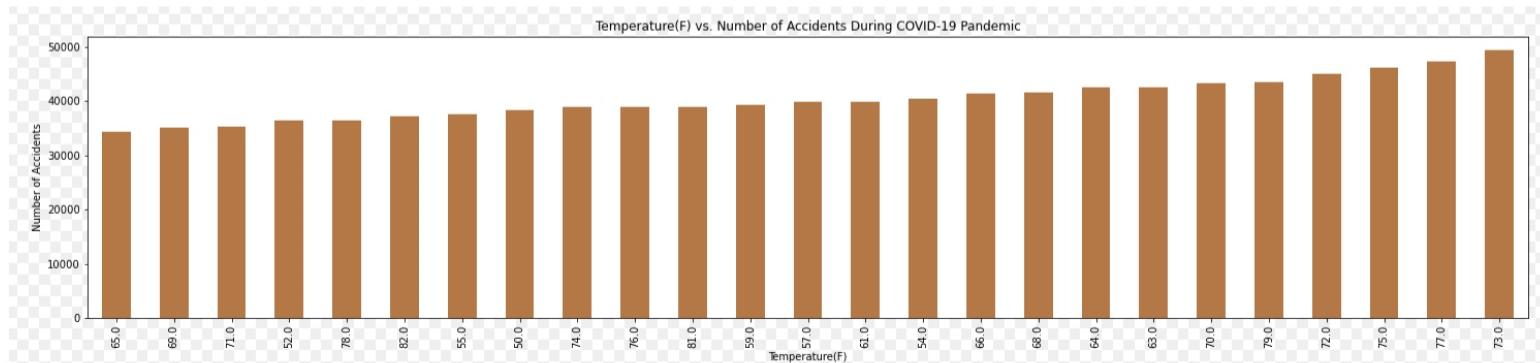
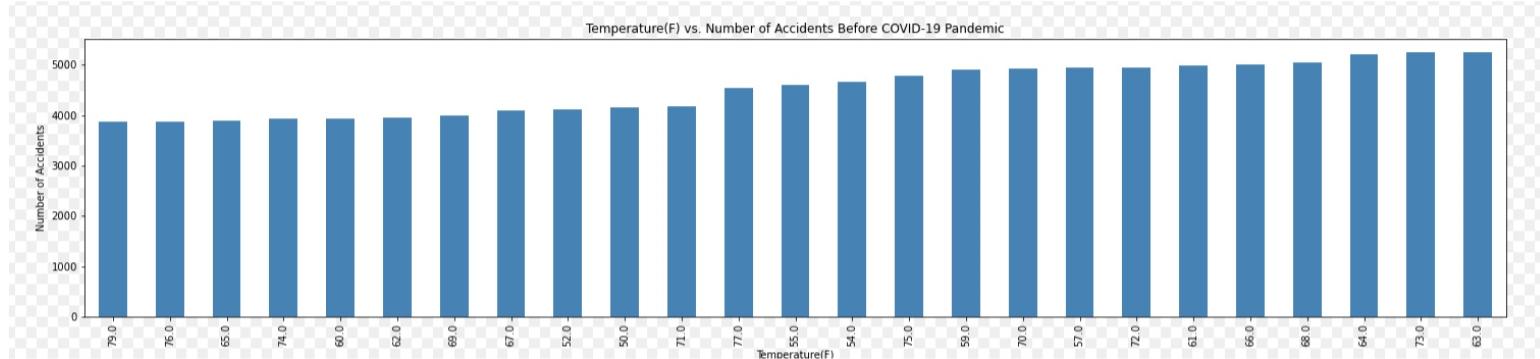
Key take-away

What caused that spike there, anyway?

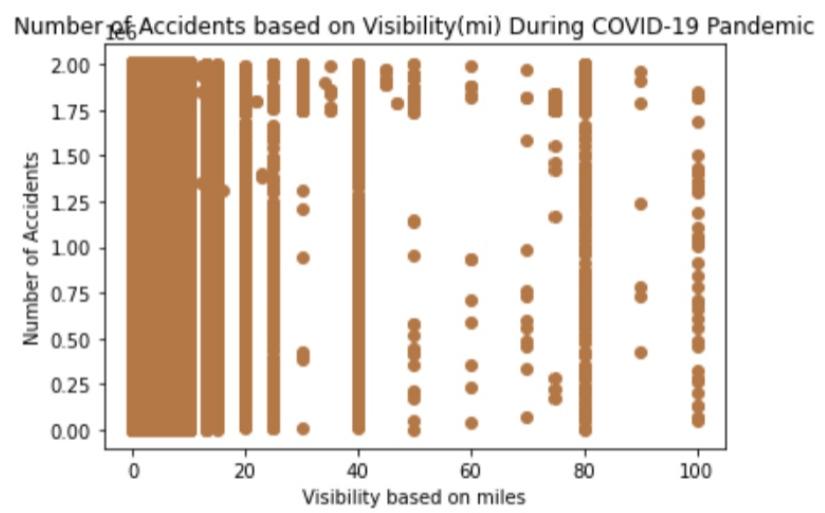
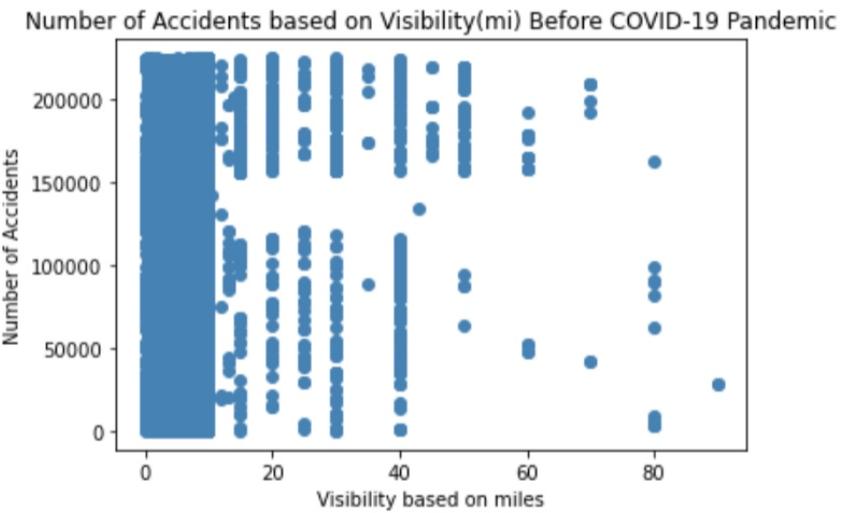
“Environmental factors on  
Accidents trend”



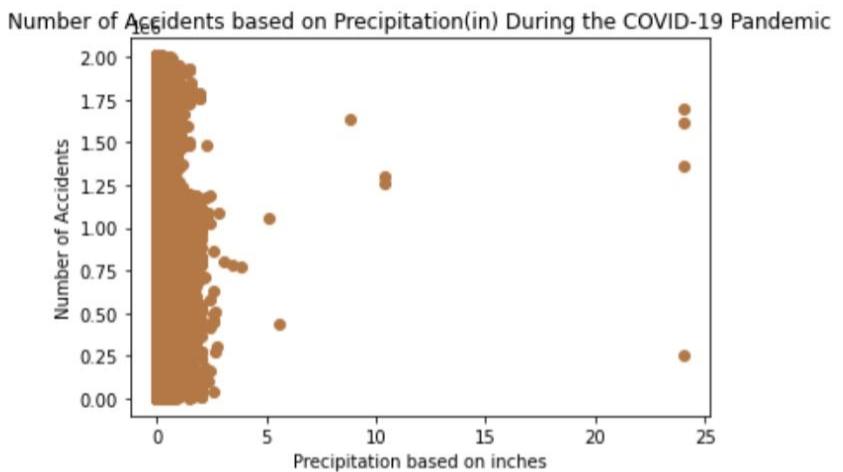
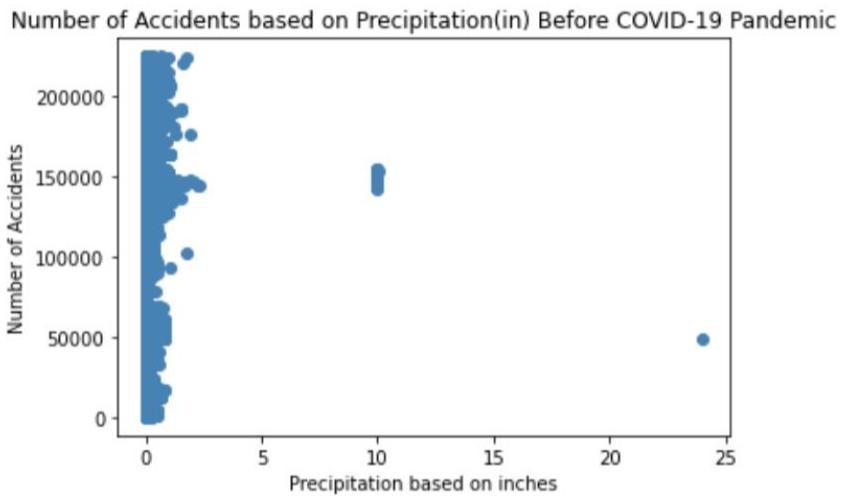
# Temperature effect



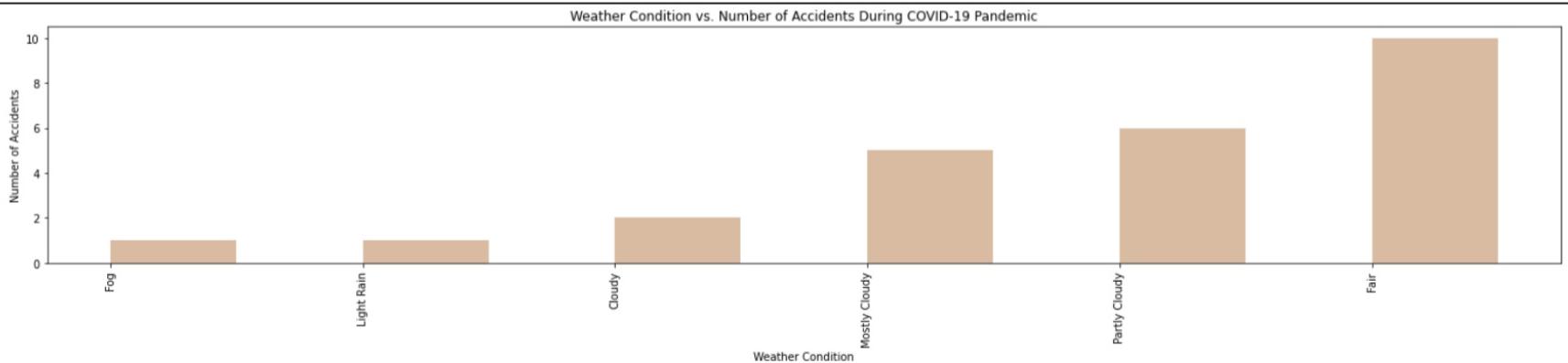
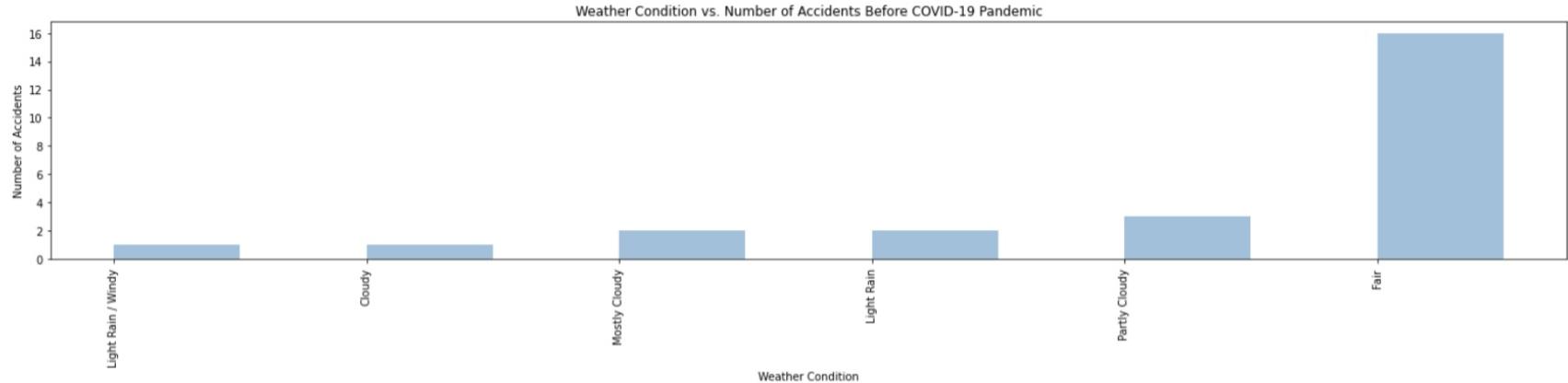
# Visibility effect



# Precipitation effect



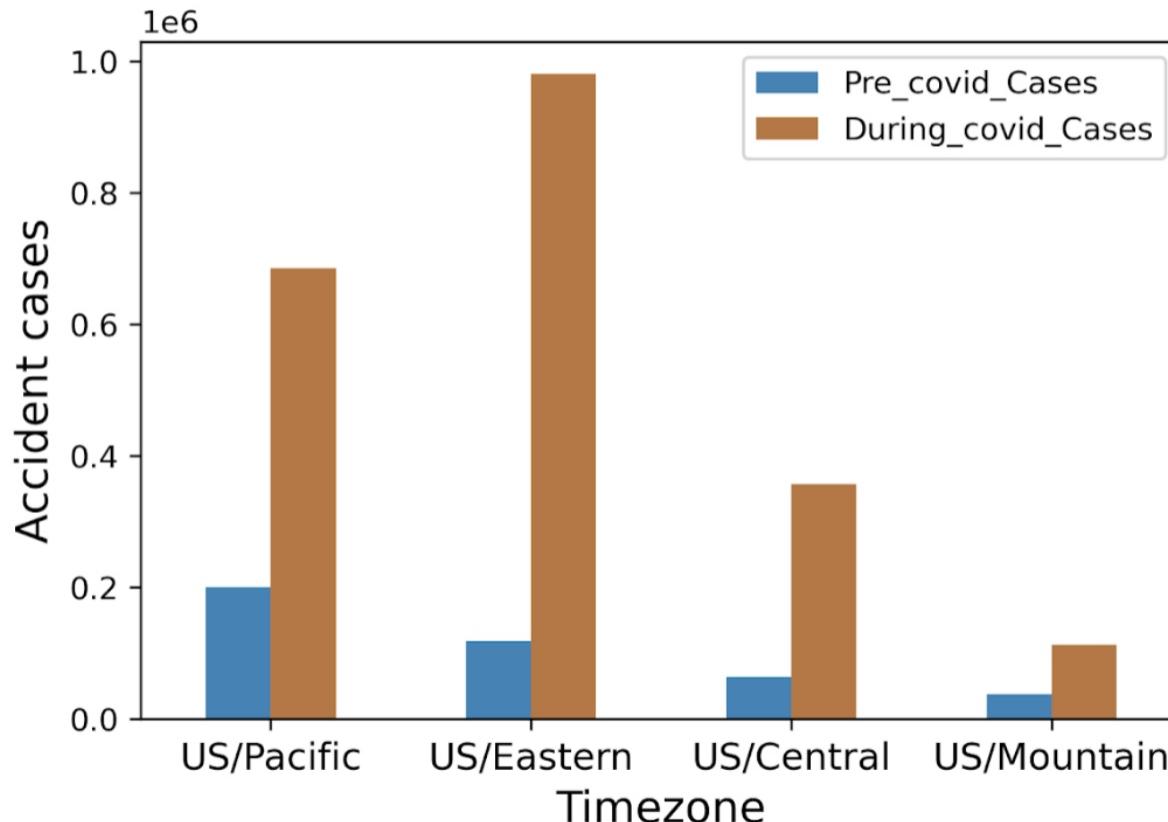
# Weather conditions effect



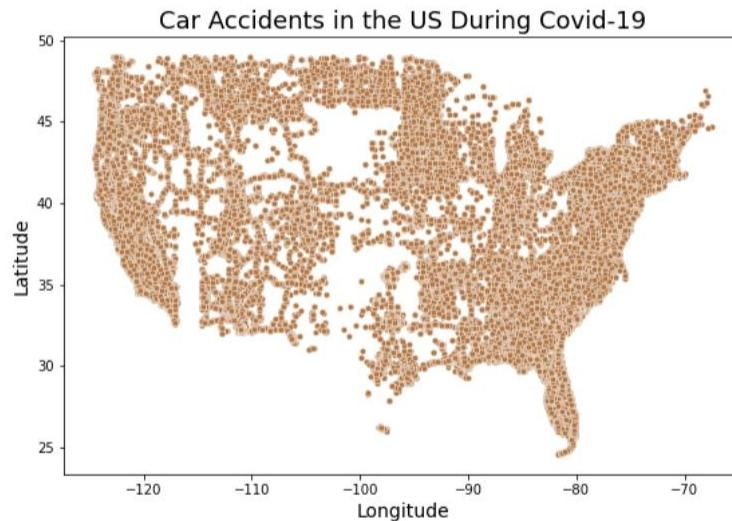
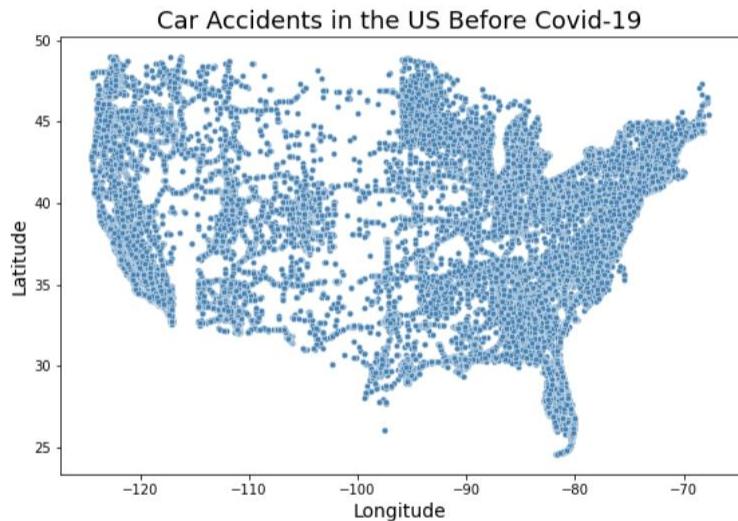
“Accidents trend by  
Timezone/cities”



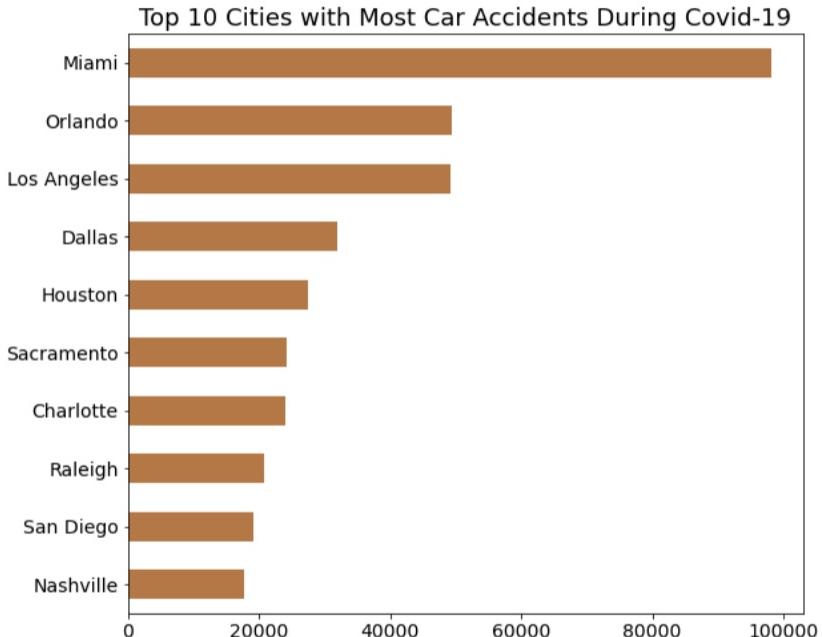
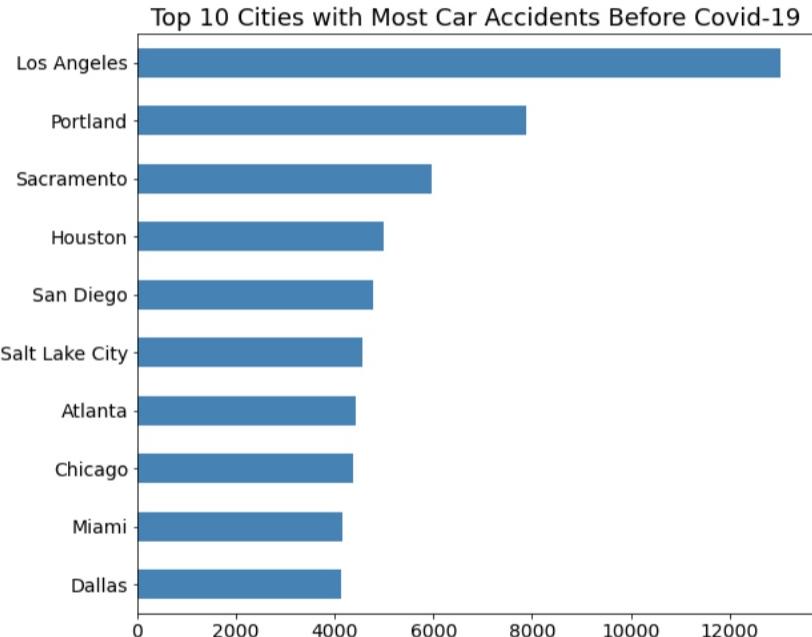
# Accidents before/during COVID per time zone



# Accidents before/during COVID per Lon/Lat



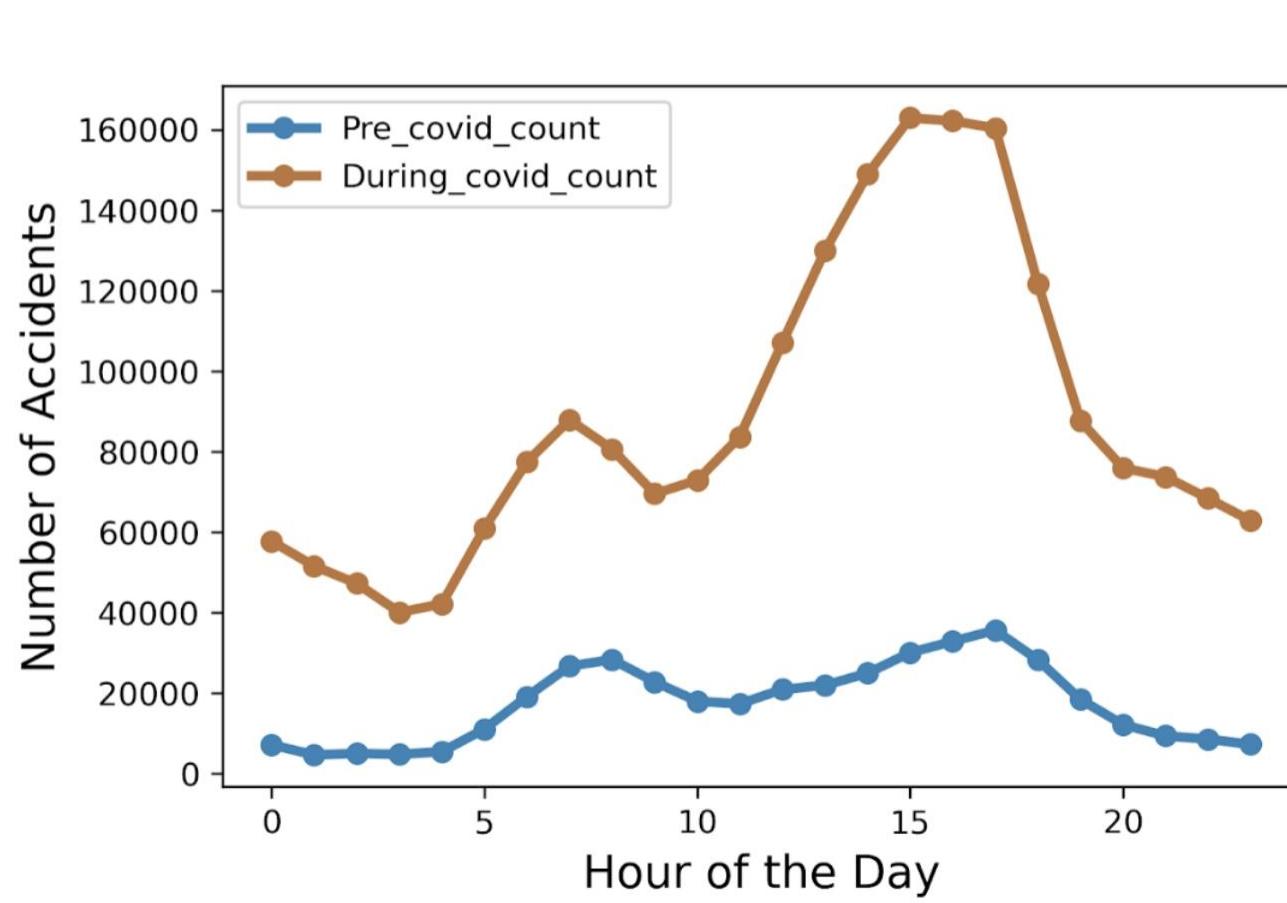
# Top 10 cities with Accidents



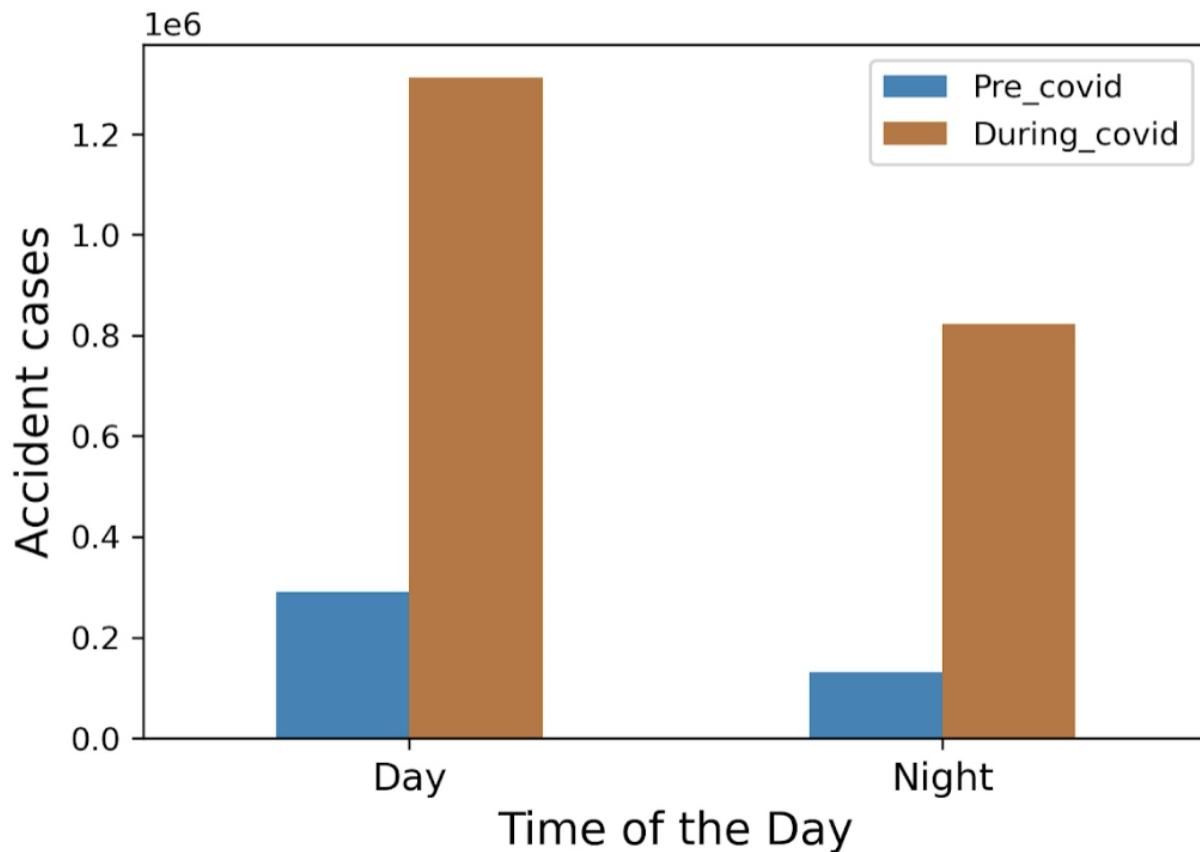
“Time of the day increase the likelihood  
of accidents?”

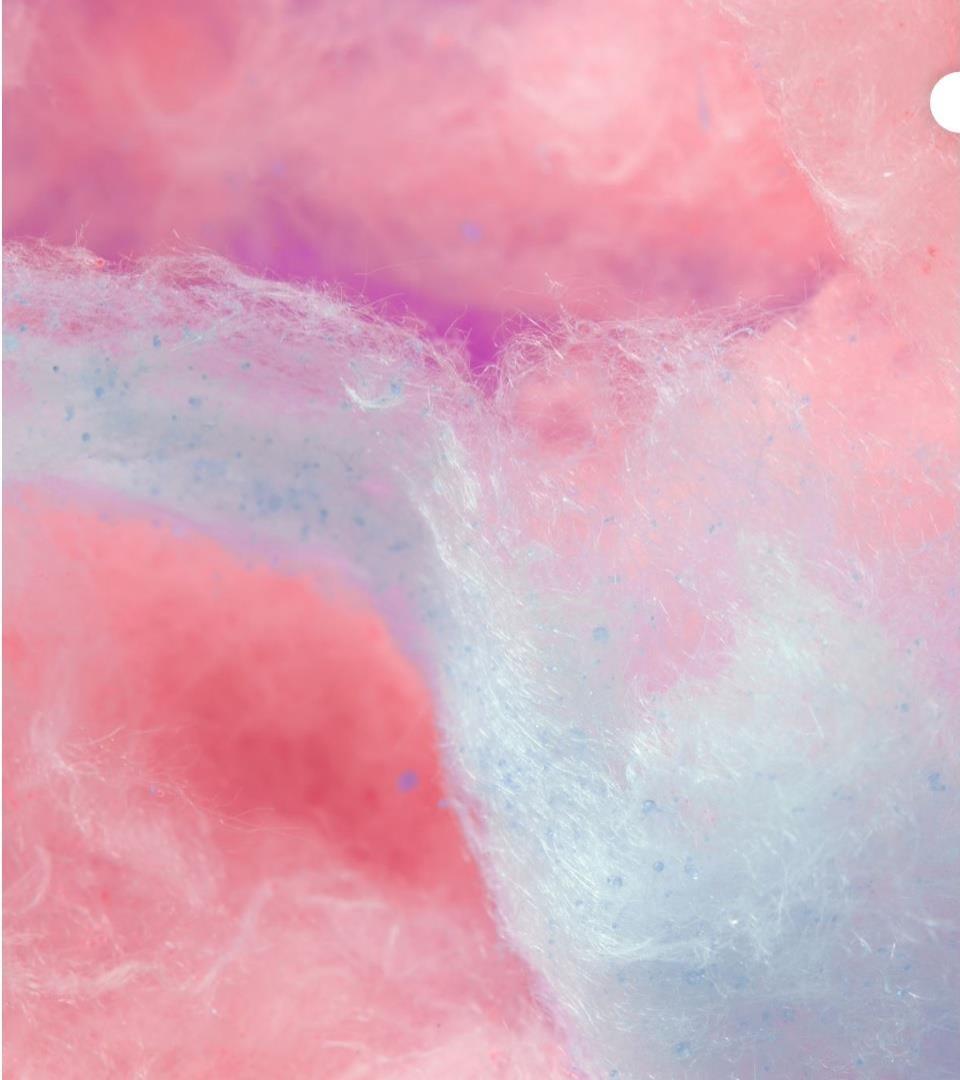


# Traffic accidents by Hour



# Accidents Day Vs Night



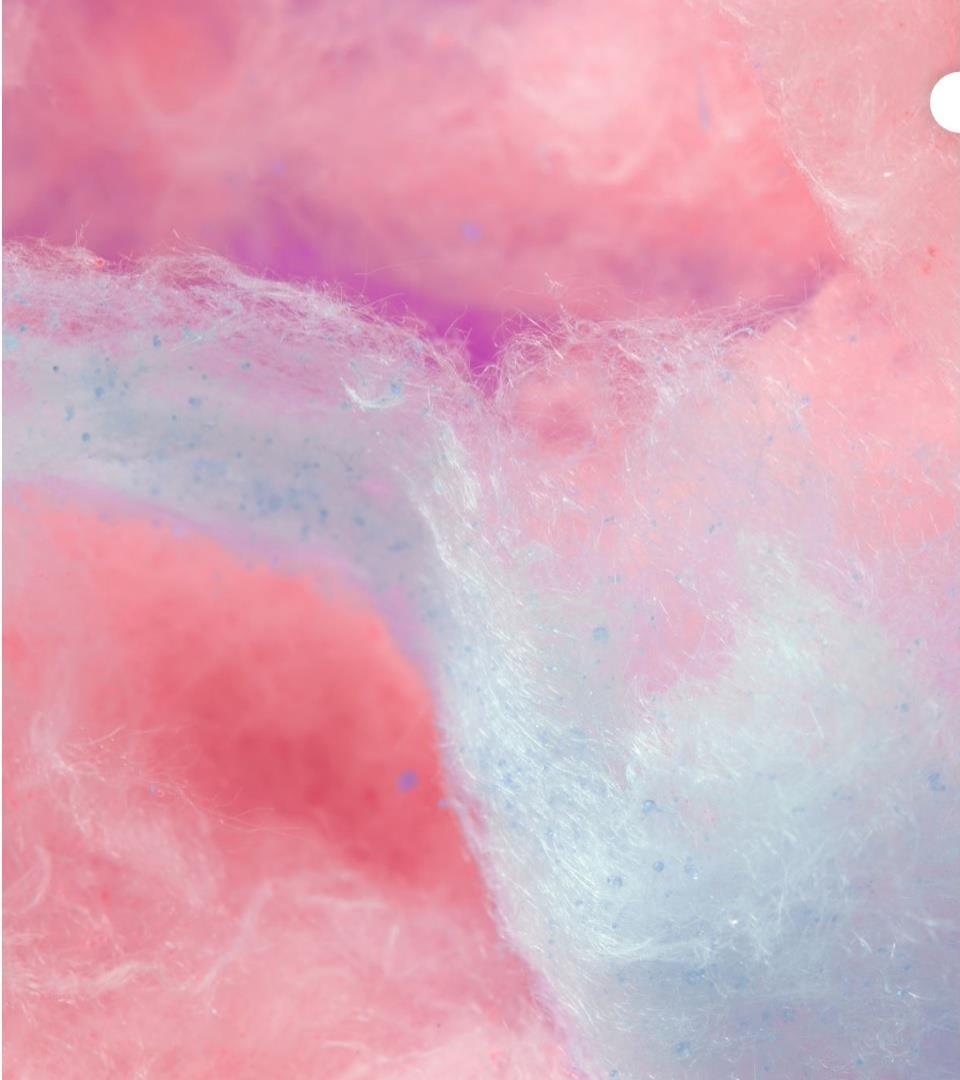


## Q1: Accidents Trend by year before and during the pandemic

Hypothesis: There is evidence of data to prove that the Accidents trend had significantly gone up during the pandemic when compared to the 2 years prior.

For various factors which are not present in the data:

- Open roads, less traffic and higher speeds.
- Inexperienced/ First time drivers on the roads?

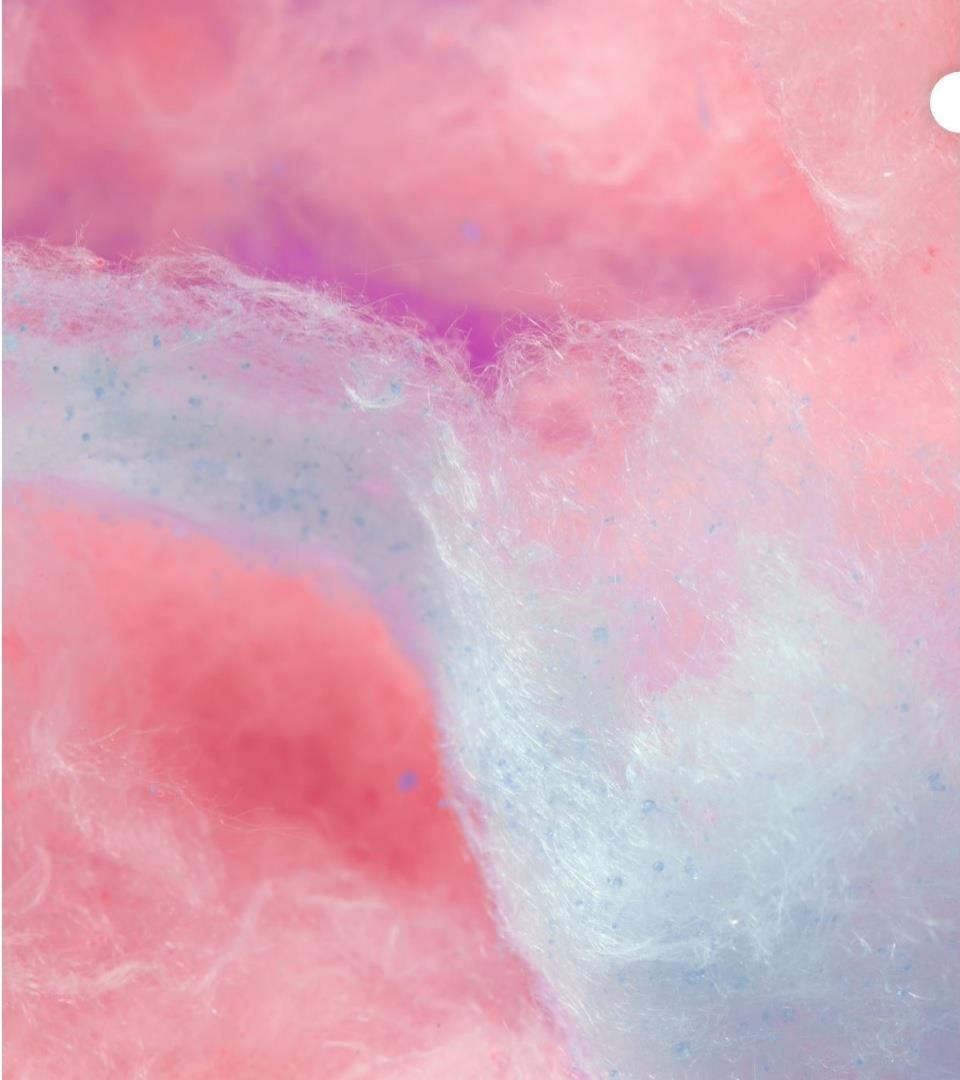


## Q2: How do environmental variables (visibility, precipitation, and temperature) affect the number of traffic accidents before and during the Covid-19 Pandemic?

Q2 Hypothesis: Null Hypothesis(H0): There is no evidence of a correlation between environmental factors and traffic accidents, even when analyzed before and during the COVID-19 pandemic.

Alternative Hypothesis (Ha): Based on data separated by the start of the COVID-19 pandemic, the existence of environmental factors such as low visibility, high levels of precipitation, temperature variation, and general weather condition, result in an increase in the number of traffic accidents over the course of the pandemic.

Q2 FINDINGS: Our dataset contains information from January 2018 through December of 2021 with a total of 2,556,561 reported traffic incidents. For question 2, after cleaning and separating the data we examined 224,843 traffic accidents prior to the start of the pandemic and 2,010,423 traffic accidents that occurred during the pandemic. In separating the data and then analyzing environmental factors, we hoped to see some difference in the number of traffic accidents to then make comparisons regarding environmental factors; however, we found that there was not a significant increase in traffic accidents as a result of the pandemic. Conclusions: Effects of Visibility: We graphed visibility at the time of the accident both during and prior to the pandemic on a scatter plot. This resulted in heavily left skewed scatter plots which suggests that visibility did not have an effect on traffic accidents. Most of the data indicated that traffic accidents took place while visibility was over 10 miles. Thus we are able to draw the conclusion that visibility at the time of the accident has little individual impact on the occurrence of traffic accidents both prior to the pandemic and during it. Effects of Temperature: We created a bar graph that showcases the number of traffic incidents with the 25 most common temperatures in the dataset. (Ranging from 65-73° F) We found that during the pandemic as well as prior to it, as temperature increased, the number of traffic accidents did as well. We can attribute this to the fact that because of nicer weather conditions, a higher population will be driving, thus resulting in more chances for accidents to occur. Effects of Precipitation: We graphed precipitation in inches at the time of the accident on a scatter plot, which resulted in a heavily left skewed scatter plot in that most accidents occurred when there was 0 precipitation. This suggests that precipitation as an individual variable does not have significant impact on traffic accidents occurring or not. We can attribute this to the fact that with the occurrence of precipitation drivers are actually more cautious while driving, thus lowering the number of accidents while there is precipitation. General Weather Condition: We graphed traffic accidents prior to and during the pandemic based on the 6 most prevalent weather conditions in the data set: Fog, Light Rain, Cloudy, Mostly Cloudy, Partly Cloudy, and Fair. This bar graph showed that the clear majority of traffic accidents occurred while general weather conditions are described as fair. This further supports our assumption that with the occurrence of some type of weather inhibitor, drivers are actually more cautious while driving, thus lowering the number of accidents while there are while there are poorer weather conditions.



## Q3: How do the numbers of road traffic accidents compare before (2018 - 2019) and during Covid-19 (2020 - 2021) in different regions of the US?

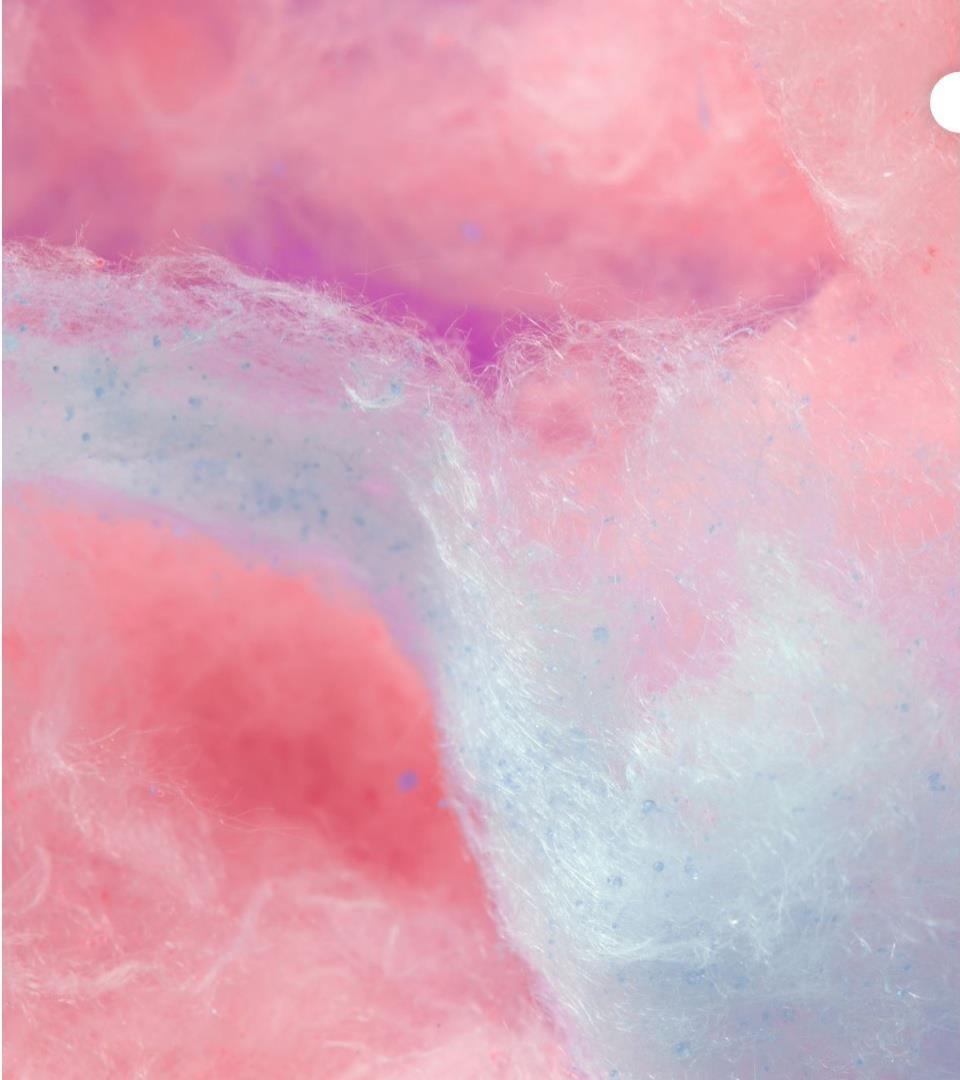
### Hypothesis:

Null Hypothesis (H0): The number of traffic accidents in the US did not differ significantly pre-Covid and during Covid-19.

Alternative hypothesis (Ha): The number of traffic accidents during Covid pandemic (is lower than pre-pandemic because people would be less likely to travel due to Covid-19 restrictions.

### Q3 FINDINGS:

#(1) The traffic accidents mainly concentrated in the East and West coasts of the US, which is probably because these areas are relatively more populated. #(2) There is a difference in the number of accidents before and during Covid, which means we can reject our null hypothesis. Contrary to our alternative hypothesis, there were more traffic accidents across the US during Covid-19 pandemic (2020 - 2021) than before Covid-19 started. #(3) The northern border states had a significant increase in the number of accident cases during Covid-19. #(4) Before Covid-19, the US/Pacific time zone had the highest number of accidents, however, most of accidents happened in the Eastern time zone during Covid-19. The Mountain zone had the lowest number of accidents before and during Covid-19. #(5) Los Angeles had the highest number of accidents before Covid-19 but dropped to number three during Covid-19; during Covid-19, the number one seat goes to Miami (note that New York City was not included in this dataset). #(6) The other cities in the top 10 before Covid-19 include: Portland, Sacramento, Houston, San Diego, Salt Lake City, Atlanta, Chicago, Miami, and Dallas. The other cities in the top 10 during Covid-19 include: Orlando, Los Angeles, Dallas, Houston, Sacramento, Charlotte, Raleigh, San Diego, and Nashville.



## Q4: Did time of day increase the likelihood of accidents before or during Covid-19? Was day-time or night-time driving affected by Covid, based on number of accidents?

### Hypothesis:

Null Hypothesis (H0): Neither daytime nor night-time driving was significantly impacted by Covid-19.

Alternative Hypothesis (Ha): The number of traffic accidents during Covid pandemic is lower, both during the day and at night, than pre-pandemic because people would be less likely to travel due to Covid-19 restrictions.

**Q4 FINDINGS:** Totals: From January 2018 through December of 2021 this dataset looked at a total of 2,556,561 reported traffic incidents. Of the total, 1,602,212 (or about 63%) of these accidents occurred during the day-time. 954,349 (or about 37%) occurred at night.

**PRE-COVID** - In the years 2018 and 2019 (Pre-Covid), daytime and night-time accidents combined were 421,781 (a little over 16% of total accidents from 2018 through 2021). Of the 420+ thousand incidents, 290,563 (or 69%) occurred during the day. 131,218 (or 31%) occurred at night.

**DURING COVID** - In the years 2019 and 2020 (During Covid), daytime and night-time accidents combined were 2,134,780 (about 84% of total accidents from 2018 through 2021). Of the 2 million + incidents, 1,311,649 (or 61%) occurred during the day. 823,131 (or about 39%) occurred at night.

**CONCLUSIONS:** Total combined accidents increased by 1,712,999 or about 405% during Covid. It is obvious that the Covid lockdown caused more drivers to be on the road, that perhaps would have otherwise been at work with vehicles parked. Digging deeper into trends of daytime vs. night-time incidents, we found that daytime incidents increased by about 351% during Covid, whereas night-time incidents increased by about 527%. So, even though there were far more incidents during the day both pre and during Covid, there was a significantly higher rate increase in night-time incidents during Covid.

Thoughts? Questions?

